

Serial No.: 09/826,274

Docket No.: VSEA 2000-009

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A cathode sub-assembly for an ion source comprising:
an indirectly heated cathode having an outer periphery and an interior area; and
a support rod being fixedly attached to the interior area of the indirectly heated cathode
for supporting the cathode within an arc chamber of the ion source ~~and avoiding gas introduction
and high pressure near the support rod~~, the indirectly heated cathode configured to emit electrons
within the arc chamber that collide with gas molecules within the arc chamber to produce ions
for implantation.
2. (Original) The cathode sub-assembly as defined in claim 1 wherein the support rod is
attached to a surface of the cathode facing away from the arc chamber.
3. (Original) The cathode sub-assembly as defined in claim 2 wherein the cathode is in
the shape of a disk.
4. (Original) The cathode sub-assembly as defined in claim 3 wherein the support rod is
fixedly attached at or near the center of the cathode, along an axis of the cathode.
5. (Original) The cathode sub-assembly as defined in claim 4 wherein the support rod is
in the shape of a cylinder and the diameter of the cathode is larger than a diameter of the support
rod.
6. (Original) The cathode sub-assembly as defined in claim 5 wherein the diameter of the
cathode is at least four times larger than the diameter of the support rod.

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7. (Original) The cathode sub-assembly as defined in claim 5 further comprising a spring loaded clamp for holding the support rod.

8. (Original) The cathode sub-assembly as defined in claim 1 wherein the support rod mechanically supports and conducts electrical energy to the cathode.

9. (Currently Amended) A cathode [[sub-]]assembly for use in an indirectly heated cathode ion source which includes an arc chamber housing that defines an arc chamber, comprising:

a cathode sub-assembly[[,.]] including a cathode and a support rod, the cathode having an outer periphery and an interior area, and a the support rod being fixedly mounted to the interior area of the cathode which avoids gas introduction and high pressure near the support rod, and the cathode being configured to mit electrons within the arc chamber that collide with gas molecules within the arc chamber to produce ions for implantation; and

a filament for configured to emitting electrons, the filament that is being positioned outside the arc chamber in close proximity to the support rod of the cathode sub-assembly; and
~~— a cathode insulator for electrically and thermally isolating the cathode from the arc chamber housing, that is disposed around the cathode of the cathode sub-assembly.~~

10. (Previously Presented) The cathode assembly as defined in claim 9 wherein the filament is disposed around the support rod in close proximity to the cathode and isolated from a plasma in the arc chamber.

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11. (Previously Presented) The cathode assembly as defined in claim 9 wherein the filament is disposed around the support rod in close proximity to the cathode and isolated from a plasma in the arc chamber, wherein the filament is fabricated of an electrically conductive material and includes an arc-shaped turn having an inside diameter greater than or equal to the diameter of the support rod.

12. (Currently Amended) A cathode assembly for use in an indirectly heated cathode ion source which includes an arc chamber housing that defines an arc chamber, comprising:

a cathode sub-assembly[[.]] including a cathode and a support rod, the cathode having an outer periphery and an interior area, and a the support rod fixedly mounted to the interior area of the cathode, the cathode configured to emit electrons within the arc chamber that collide with gas molecules within the arc chamber to produce ions for implantation; and

a filament ~~for configured to emitting electrons, that is the filament being positioned~~ outside the arc chamber in close proximity to the support rod of the cathode sub-assembly, ~~and~~
~~a cathode insulator for electrically and thermally isolating the cathode from the arc chamber housing, that is disposed around the cathode of the cathode sub-assembly;~~

wherein the filament is disposed around the support rod in close proximity to the cathode and isolated from a plasma in the arc chamber, wherein the filament is fabricated of an electrically conductive material and includes an arc-shaped turn having an inside diameter greater than or equal to the diameter of the support rod, and wherein a cross-sectional area of the filament varies along a length of the filament, and is smallest along the arc-shaped turn.

13. (Canceled)

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14. (Currently Amended) The cathode assembly as defined in claim[[13]] 27 wherein a vacuum gap is provided between the cathode insulator and the cathode to limit thermal conduction.

15. (Currently Amended) The cathode assembly of claim[[13]] 27 wherein said cathode insulator has a generally tubular shape with a sidewall and includes a flange, for shielding the sidewall of the cathode insulator from a plasma in the arc chamber.

16. (Previously presented) The cathode assembly of claim 15 wherein said flange is provided with a groove on a side of the flange facing away from the plasma, for increasing a path length between the cathode and the arc chamber housing.

17. (Currently Amended) A method for supporting and indirectly heating a cathode of an ion source comprising:

supporting the cathode having an outer periphery and an interior area by a rod fixedly attached to the interior area of the cathode ~~which avoids gas introduction and high pressure near the rod;~~

bombarding the cathode with electrons from a filament positioned outside an arc chamber of the ion source for heating of the cathode; and

emitting electrons from the cathode for collision with gas molecules within the arc chamber to produce ions for implantation.

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18. (Currently Amended) A cathode assembly for an ion source comprising:
a cathode having an outer periphery and an interior area;
a support rod fixedly attached to the interior area of the cathode ~~which avoids gas introduction and high pressure near the support rod; and~~
~~a cathode insulator for electrically and thermally isolating the cathode from an arc chamber housing; and~~

an indirect heating device for indirectly heating the cathode, wherein the cathode is configured to emit electrons within an arc chamber of the ion source that collide with gas molecules within the arc chamber to produce ions for implantation in response to the heating of the cathode.

19. (Previously Presented) The cathode sub-assembly as defined in claim 1 wherein the support rod is press fitted to the indirectly heated cathode.

20. (Previously Presented) The cathode assembly as defined in claim 9 wherein the support rod is press fitted to the cathode.

21. (Previously Presented) The cathode assembly as defined in claim 12 wherein the support rod is press fitted to the cathode.

22. (Canceled)

23. (Previously Presented) The method as defined in claim 17 wherein the step of supporting comprises press fitting the rod to the cathode.

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24. (Previously Presented) The cathode assembly as defined in claim 18 wherein the support rod is press fitted to the cathode.

25. (Currently Amended) ~~A cathode sub-assembly for an ion source comprising:~~
~~an indirectly heated cathode having an outer periphery and an interior area, the indirectly heated cathode configured to emit electrons within an arc chamber of the ion source that collide with gas molecules within the arc chamber to produce ions for implantation; and~~
~~a support rod press fitted to the interior area of the indirectly heated cathode for supporting the cathode within the arc chamber which avoids gas introduction and high pressure near the support rod~~ The cathode sub-assembly as defined in claim 1, further comprising a filament configured to emit electrons, wherein the support comprises a first surface having an edge directly coupled to the indirectly heated cathode, and wherein the filament is disposed around the first surface in close proximity to the cathode.

26. (New) The cathode assembly as defined in claim 9, further comprising a cathode insulator disposed around the cathode of the cathode sub-assembly, wherein the cathode insulator is configured to electrically and thermally isolate the cathode from the arc chamber housing.

27. (New) The cathode assembly as defined in claim 26, wherein said cathode insulator includes an opening having a diameter that is larger than or equal to the diameter of the cathode.